

REMARKS

On December 14, 2006, applicants submitted a Reply to Final Office Action with a Notice of Appeal. On January 12, 2007, applicants received an Advisory Action in which the Examiner stated that the amendments submitted on December 14, 2006 would not be entered. Here applicants submit a Request for Continued Examination and a newly amended set of claims. Applicants respectfully request entry and reconsideration of this newly amended set of claims.

Claims 1-30 are pending. In the Final Office Action dated December 14, 2006, Claims 1, 2, 4, 6, 10, 12, 13, 15, 17, 19, 23-26, 29, and 30 were rejected under 35 USC §103(a) as being obvious over Bennett et al. (US 7,024,268) in view of Lee et al (US 6,517,412). Claims 3, 5, 7-9, 11, 14, 16, 18, 20-22, 27 and 28 were rejected under 35 U.S.C. §103(a) as being obvious over Bennett in view of Lee and further in view of Campbell et al. (US 6,230,069).

With this response, claims 1, 10, 23, and 30 have been amended. Claim 1 has been amended to include the limitation, “updating the first and second component based upon the difference between the measured values and the predicted values of the characteristics of the first and second dielectric layers to obtain an updated model.” Claim 10 has been amended to include the limitation, “calculating an updated process recipe for use in processing a subsequent wafer based upon the updated model of step (d).” Claim 23 has been amended to teach a “polishing means for polishing at least first and second layers of a wafer using a polishing recipe based upon the model of step (a).” Claim 30 has been amended to clarify that the recited system comprises “a computer for calculating an updated model based upon the difference between the measured value and the predicted value of the wafer characteristic and an updated process recipe for use in processing a subsequent wafer based upon the updated model.” After the amendments herein, claims 1-30 remain pending in the application.

Applicant submits that the above amendments are fully supported by the specification and no new matter is added by the amendments. The specification discloses, “the model of the present invention defines the polishing process as a series of polishing steps, such that one or more polishing steps are associated with removal of a first film layer and one or more different polishing steps are associated with removal of a second film layer.” (Paragraph [0038]) Further,

the specification discloses that the “model treats polishing of each layer independently and develops a model for each layer, and then the “models (or sub-models) are then combined in a linear relationship to define a model for the entire film.” (Paragraph [0038]) According to the specification, “[i]n developing a model, each layer is treated as an independent film and a separate model is developed to describe the CMP process for each layer based on data obtained from the DOE data for that layer.” (Paragraph [0041]) The specification explains, “[t]o obtain DOE data, a polishing step is run and, based upon incoming measurements, e.g., pre-polishing and post-polishing wafer thickness measurements, and processing parameter values, a removal rate profile or, equivalently, a wafer thickness profile, can be determined for each layer.” (Paragraph [0039])

In the advisory action, the Examiner asserts that Bennett teaches a computer-implemented method for updating a process step in a CMP process for a multi-layer wafer. The Examiner further asserts that Bennett teaches polishing of a metal layer and polishing of a layer of metal oxides. Applicants respectfully disagree. Bennett does not teach “CMP processing of a wafer having at least *first* and *second dielectric layers*,” as recited in claim 1. Instead, Bennett provides feedback-controlled polishing of a *single metal layer*. The model described in Bennett neither “receiv[es] a ... second measured value of the characteristic of the second dielectric layer,” nor “updat[es] the first and second component based upon the difference between the measured values and the predicted values of the characteristics of the first and second dielectric layers to obtain an updated model,” as recited in amended claim 1. Bennett discloses that “[d]uring each polishing cycle [of a metal layer], a first and second polishing process are sequentially performed on a current substrate.” (Col. 5, lines 8-10). Bennett elsewhere teaches that the “first polishing process clears the first metal layer from the substrate during the first polishing cycle” and that the method calculates “clearing times of the first polishing process.” (Col. 3, lines 3-7). According to Bennett, “[p]olishing proceeds at the second polishing station [] until the metal layer is removed and the underlying barrier layer is exposed” (Col. 10, lines 21-30).

Bennett suggests that “when the polishing begins at the second polishing station, ...[an] initial polishing, which can be termed an ‘initiation’ step, may be needed to remove native oxides formed on the metal layer.” (Col. 10, lines 12-18) However, the optical monitoring

system determines an endpoint when the metal layer is removed and the underlying barrier layer is exposed. The optical monitoring system determines this endpoint by detecting the change in reflectivity as the barrier layer is exposed. (Col. 10, lines 27-30) Although polishing of the metal layer can take place at two polishing stations, polishing at both polishing stations is defined in a single model. "Monitoring information obtained from the second polishing station during a current polishing cycle is used as feedback to adjust either the first or second polishing process of a subsequent polishing cycle." (Col. 4, lines 1-4). See also, Figure 5. Thus, only the metal polishing process is modeled and updated in the Bennett process.

In view of the above, Applicants submit that the amendments to the claims place the claims in condition for allowance. A favorable Notice to that effect is respectfully requested.

Applicants note that the PTO Forms 1449 previously submitted on June 16 and August 2004 have not been signed. Applicants urgently request that these PTO Forms 1449 be initialed and returned to applicant. Courtesy copies of the previously submitted forms are provided.

Respectfully submitted,

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